MDS

AXIS SWITCH

POSISwitch® AX 5000

for POSIDRIVE® MDS 5000

Mounting and Commissioning Guidelines

Be sure to read and adhere to this mounting and commissioning instructions before mounting and commissioning!

MANAGEMENTSYSTEM

certified by DQS according to
DIN EN ISO 9001, DIN EN ISO 14001
Reg-No. 000780 UM/QM

COMMISSIONING

CONNECTION

MOUNTING

SV 5.1

GB **02/2005**

STÖBER

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1 NOTES ON SAFETY

Before mounting and commissioning, be sure to read these mounting and commissioning instructions to prevent the occurrence of avoidable problems during commissioning and/or operation.

POSISWITCH® AX 5000 of the MDS family is a supplemental module for **POSIDRIVE**® of the MDS family. In the sense of DIN EN 50178 (earlier VDE 0160), it is an electrical resource of power electronics (BLE) for the regulation of energy flow in high-voltage systems. It is exclusively intended for powering servo machines. Handling, mounting, operation and maintenance must be performed in adherence to valid regulations and/or legal specifications, applicable standards and this technical documentation.
This is a restricted marketing class product in accordance with IEC 61800-3. In residential areas, this product may cause high-frequency interference for which the user may be called on to provide suitable countermeasures.

Strict adherence to all rules and regulations must be ensured by the user.

The safety notes and specifications contained in further sections (items) must be adhered to by the user.

Caution! High touch voltage! Danger of shock! Hazardous to life!

When power is applied, the connections may not become disconnected under any circumstances. **POSI**Switch® AX 5000 may not be opened. Prerequisite for the correct **POSI**Switch® AX 5000 function is the correct configuration and mounting of the inverter drive. The device may only be transported, installed, commissioned and controlled by specialized personnel who are qualified for this task.

Pay particular attention to:

- Permissible protection class: Protective ground. Operation is only permitted with regulation connection of the protective conductor. Direct operation of the devices on IT networks is not possible.
- Installation work may only be performed when the power is disconnected. When work must be performed on the drive, inhibit the enable of the inverter and disconnect the entire drive from the power network. (Adhere to the 5 safety rules.)
- Discharge time of the DC link capacitors on the inverter > 5 minutes
- Do not penetrate the inside of the device with any kind of object.
- When performing mounting or any other work in the switching cabinet, protect the device from falling objects (pieces of wire, leads, metal parts, and so on). Parts with conductive properties can cause a short circuit on the connections (terminal strips, sockets) and device failure
- Before commissioning, make sure that the plug connectors are positioned correctly and the connections are secured tightly with screws.

POSISwitch® AX 5000 must be installed in a switching cabinet in which the maximum ambient temperature is not exceeded (see technical data). Avoid humidity.
Only copper wires may be used. The line cross sections to be used are listed in table 310-16 of standard NEC at 60 °C or 75 °C.

STÖBER ANTRIEBSTECHNIK GmbH + Co. KG accepts no liability for damages caused by non-adherence to the instructions or the applicable regulations.

The motors must be equipped with integrated temperature monitoring or external motor overload protection must be used.

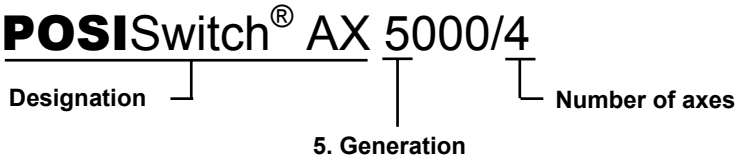
POSISwitch® AX 5000 is only certified for operation on **POSIDRIVE**® of the MDS family.

Notes:

Subject to technical changes to improve the devices without prior notice. This documentation is purely a product description. It is not a promise of properties in the sense of warranty law.

2 TECHNICAL DATA

Model key



2.1 Electrical

Device Type	**POSI**Switch® AX 5000/4

General	
ID no.	44573
Voltage	24 V ±20% (protected against polarity reversal)
Current consumption (without encoder and contactor)	<100 mA
Ambient temperature	0 – 45 °C
Encoder system	EnDat®

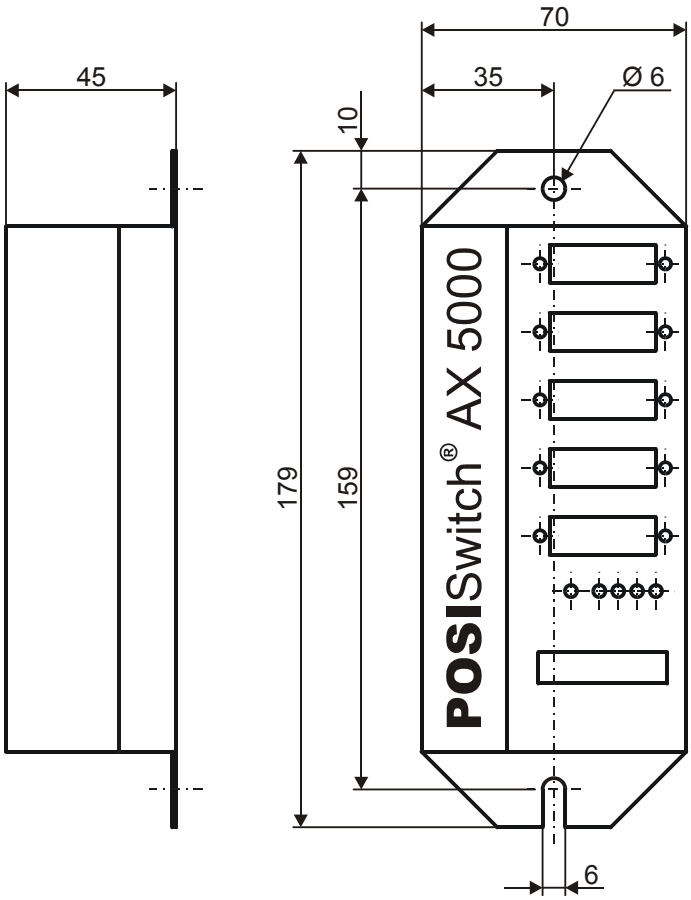
EnDat® Port	
Input level	TIA/EIA 485 / 422
Connection, encoder input	Sub D 15-pole (STÖBER contact allocation)
Connection, encoder output	SUB D 15-pin (STÖBER contact allocation – see connection cable in chap. 8)
Output level	TIA/EIA 485
EnDat® version	EnDat® 2.1
Max. clock pulse frequency	2 MHz
Switchover time	< 200 µsec
Galvanic isolation EnDat® input to EnDat® input	No
Galvanic isolation EnDat® input to 24 V supply	500 V
Max. cable length between **POSI**Switch® and inverter	80 m[1]
Max. cable length between **POSI**Switch® and encoder	20 m[1]
Voltage for encoder	5.25 V
Max. output current for encoder	200 mA

Power protection	
Number of protective connections	4
Max. output current	800 mA (limitation 900 mA)
Output voltage	min. 22 V at 600 mA
Connection	Screw-type terminal (max. 1.5 mm²)
Galvanic isolation to EnDat®	Yes

[1] Only valid in connection with STÖBER cables

2.2 Mechanical

Specifications in mm



3 MECHANICAL INSTALLATION

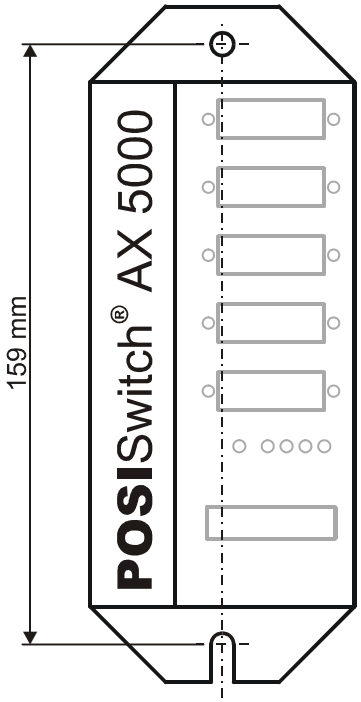
This chapter gives you complete information on the subject of mechanical installation.
Only specialized personnel qualified for this task may install, commission and control the device.

3.1 Installation Location

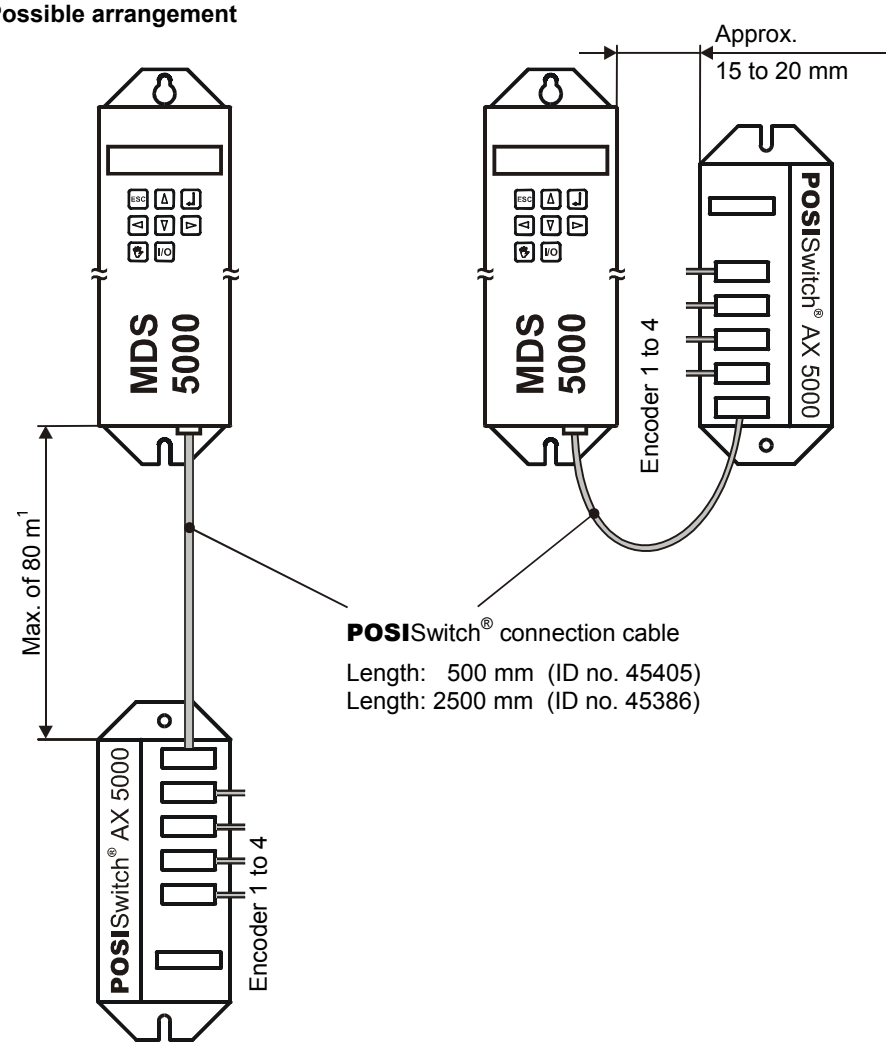
- Operate only in closed switching cabinet.
- Avoid installation above heat-generating devices.
- Ensure sufficient air circulation in the switching cabinet.
  (The installation site of **POSI**Switch® AX 5000 may not hinder the air circulation of the inverter.)
- The installation site must be free of dust, corrosive fumes and all liquids (in accordance with soil degree 2 as per EN 60204 / EN 50178).
- Avoid humidity.
- Avoid condensation (e.g., due to anti-condensation heaters).
- To satisfy EMC requirements, use mounting plates with conductive surfaces (e.g., unpainted).

3.2 Mounting

Drilling jig



Possible arrangement



POSISwitch® connection cable

Length: 500 mm (ID no. 45405)
Length: 2500 mm (ID no. 45386)

[1] Valid only in connection with STÖBER cables

4 ELECTRICAL INSTALLATION

This chapter gives you complete information on the subject of electrical installation.
Only specialized personnel qualified for this task may install, commission and control the device.

4.1 EMC

This chapter gives you general information on EMC-suitable installation. These are only recommendations. Depending on the application, the ambient conditions and the legal requirements, measures in addition to the following recommendations may be necessary.

- Mount device on conductive surface (unpainted).
- Motor cables must be installed in separate space from the encoder cables.
- Use only shielded cables for motor and encoder lines (corresponding cabels can be ordered from STÖBER ANTRIEBSTECHNIK.).
- Apply shield of the motor cable on both sides.
- The circuit breakers may not interrupt the shield lines.
- Output derating must be used for motor lines > 50 m.
- When an additional transmission plug connector is installed in the motor cable, the shield may not be interrupted and the plug connection may not be opened when the motor is electrified.
- When the braking line is installed in the motor cable, the braking line must be shielded separately.

4.2 Connection of POSI Switch® AX 5000 to MDS 5000

POSISwitch® AX 5000 is controlled by **POSIDRIVE**® MDS 5000. A connection via socket X4 on the MDS 5000 to plug X500 on the AX 5000 enables the switching of the axes. Completely prefabricated cables are available in the lengths 500 mm (ID no. 45405) and 2500 mm (ID no. 45386). Cf. chap. 8.

POSISwitch® AX 5000 is usually installed in the immediate vicinity of the inverter (see chap. 3.1 and 3.2). However, if this is not possible or desirable, a cable of up to 80 m[1] in length can be used.

4.3 Connection of POSI Switch® AX 5000 to Position Encoder

The encoders of the individual servo motors are connected to **POSI**Switch® AX 5000 with the normal STÖBER encoder cable. The encoder of the first motor is connected with the socket Enc. 1. The encoder of the second motor is connected with the socket Enc. 2 and so on.

The length of the encoder cable may not exceed 20 m[1].

4.4 Connection of Temperature Sensors and Braking Contacts

Activation of a halting brake and the evaluation of the temperature sensors on the motors is handled with *braking module for 24 V brake* (BRM 5000). The brakes or temperature sensors (positor lines) allocated to the motors are activated and deactivated via auxiliary contacts of the applicable power relays/contactors. Chapter 7 contains examples of correct wiring.

4.5 Connection of Power and Relays/Contactors

POSISwitch® AX 5000 is powered with 24 V via the screw-type terminal strip X501 (terminals 1 and 2). Power consumption is a maximum of 1 A. The power relays/contactors are controlled via the AX 5000 on terminals X501.6 to X501.9. The contactors are powered via terminals X501.4 and X501.5. Chapter 7 contains examples of correct wiring.

4.6 Connection of Motors

The motors are activated and deactivated via power relays/contactors. **POSI**Switch® AX 5000 controls and checks the power relays/contactors. Chapter 7 contains examples of correct wiring.
Please adhere to the EMC recommendations.

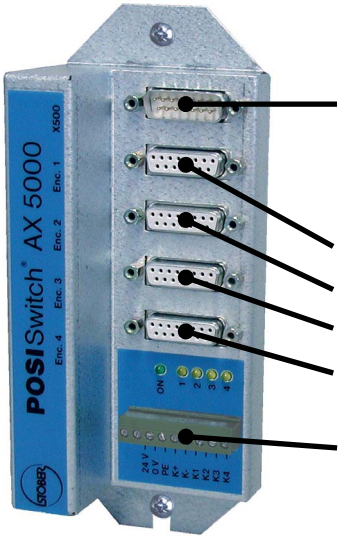
Use to switch the motor temperature sensor relay contacts for low currents/voltages (gold contacts).

[1] Only valid in connection with STÖBER cables

5 CONNECTION ALLOCATION

This section explains the position, designation and allocation of the terminals.

5.1 Terminal Overview



X500
Connection for the
POSIDRIVE® MDS 5000

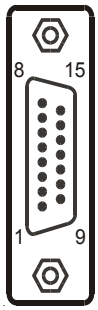
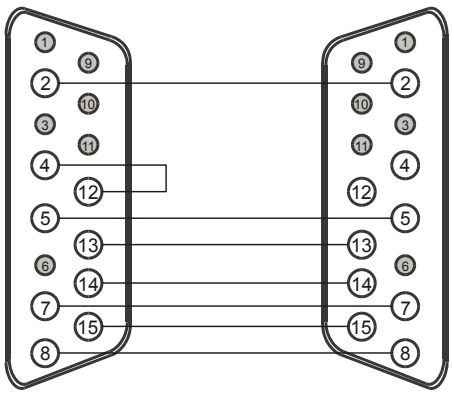
Enc. 1
Enc. 2 Connection for
Enc. 3 encoders 1 - 4
Enc. 4

X501 Power & relays

5.2 Terminal Allocation

This section presents and describes all interfaces. The exact position is given in chap. 5.1.

X500 – connection for POSIDRIVE® MDS 5000

PIN[11]		Signal / Function	Description	Circuiting
	1	NC	Not connected	**POSI**Switch® cable  **MDS 5000** X4 **POSI**Switch® X500
	2	GND	**Reference potential** Digital ground	
	3	NC	Not connected	
	4	VCC	**Power supply 5 V_{DC}** Is jumpered internally with pin 12	
	5	DATA+	**Differential input / output** For data signal	
	6	NC	Not connected	
	7	ERROR+	**Differential output** For error signal	
	8	CLK+	**Differential input** For clock pulse signal	
	9	NC	Not connected	
	10	NC	Not connected	
	11	NC	Not connected	
	12	Sense	**Sense connection** Is jumpered internally with pin 4	
	13	DATA-	**Differential input / output** (inverse) For data signal	
	14	ERROR-	**Differential output** (inverse) For error signal	
	15	CLK -	**Differential input** (inverse) For clock pulse signal	

[1] View of terminal/sub D

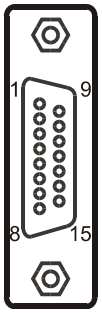
X501 – voltage supply and relays

PIN[1]	Signal / Function	Description	Circuiting
1	+24V_{DC}	**Voltage supply** Powers **POSI**Switch® AX 5000 and the motor encoder	
2	0V	**Reference potential** For voltage supply / PIN 1	
3	PE	**Protective conductor** Connection to housing	
4	K+	**Power for the relays** + Potential for powering power relays/contactors U_{min} = 5 V; U_{max} = 30 V	
5	K-	**Reference potential** For terminal 4	
6	K1 OUT	**Relay output 1** For first axis I_{max} with 24 V = 0.5 A Internal safety circuit with free-wheeling diode for relay coil.	
7	K2 OUT	**Relay output 2** For second axis I_{max} with 24 V = 0.5 A Internal safety circuit with free-wheeling diode for relay coil.	
8	K3 OUT	**Relay output 3** For third axis I_{max} with 24 V = 0.5 A Internal safety circuit with free-wheeling diode for relay coil.	
9	K4 OUT	**Relay output 4** For fourth axis I_{max} with 24 V = 0.5 A Internal safety circuit with free-wheeling diode for relay coil.	

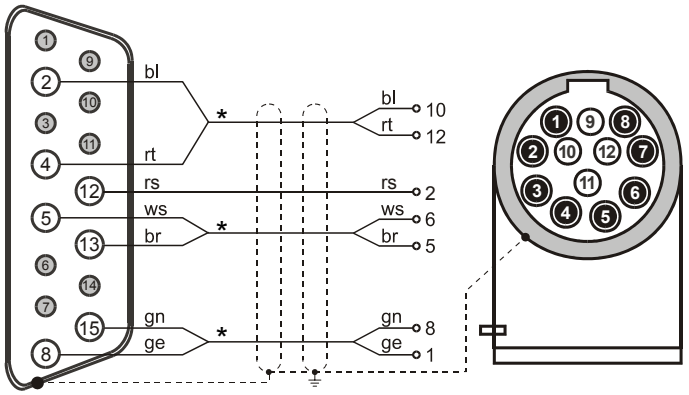
[1] View of terminal/sub D

Enc. 1; Enc. 2; Enc 3; Enc. 4 – connection for encoders 1 - 4

PIN[1]	Signal / Function	Description	Circuiting
1	NC	Not connected	
2	GND	**Reference potential** Digital ground	
3	NC	Not connected	
4	VCC	**Power supply 5 V_{DC}** Is jumpered internally with pin 12	
5	DATA+	**Differential input / output** For data signal	
6	NC	Not connected	
7	NC	Not connected	
8	CLK+	**Differential output** For clock pulse signal	
9	NC	Not connected	
10	NC	Not connected	
11	NC	Not connected	
12	Sense	**Sense connection** Is jumpered internally with pin 4	
13	DATA-	**Differential input / output** (inverse) For data signal	
14	NC	Not connected	
15	CLK -	**Differential output** (inverse) For clock pulse signal	



Connection of the encoder to POSI Switch® AX 5000



Terminal, enc. 1 to 4 on POSISwitch®

Encoder connection Bracket flange socket motor

Signal	Clock+	Sense	DATA-	DATA+	Clock-	UB+	DGND
Enc. 1-4	8	12	13	5	15	4	2
Motor[1]	1	2	5	6	8	12	10
Cable[2]	ge	rs	br	ws	gn	rt	bl

1) PIN number of 12-pin encoder plug for STÖBER ED/EK motor
2) Color when STÖBER encoder cable is used

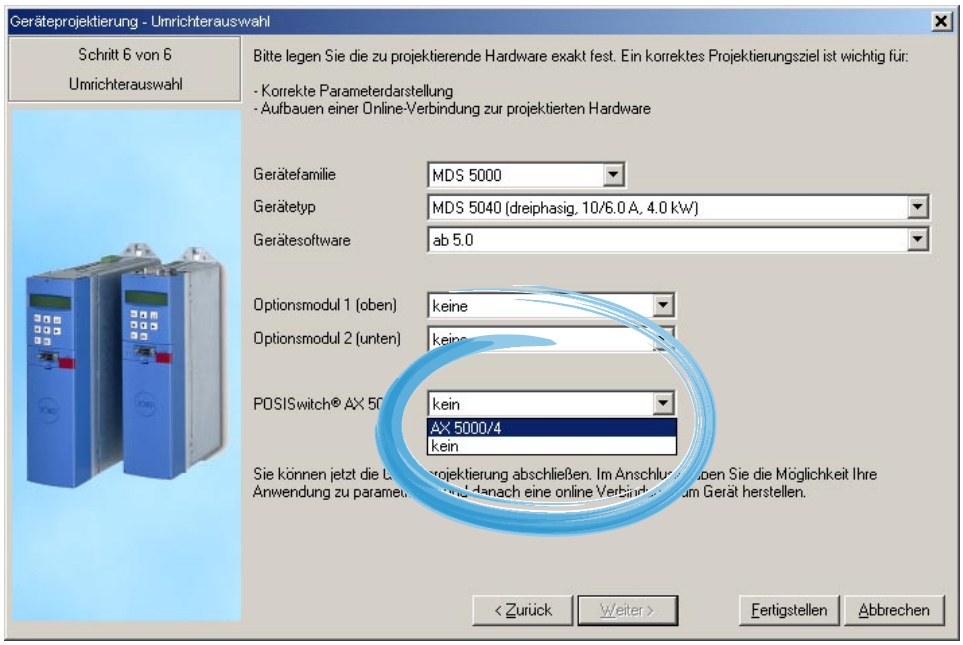
ge = yellow, rs = pink, br = brown, ws = white, gn = green, rt = red, bl = blue

* Cables twisted in pairs

[1] View of terminal/sub D

6 CONFIGURATION

This chapter describes the configuration of **POSI**Switch® AX 5000.
The user decides whether **POSI**Switch® will be used in the configuration assistants during the step “inverter selection”. An appropriate selection is offered here (see figure).

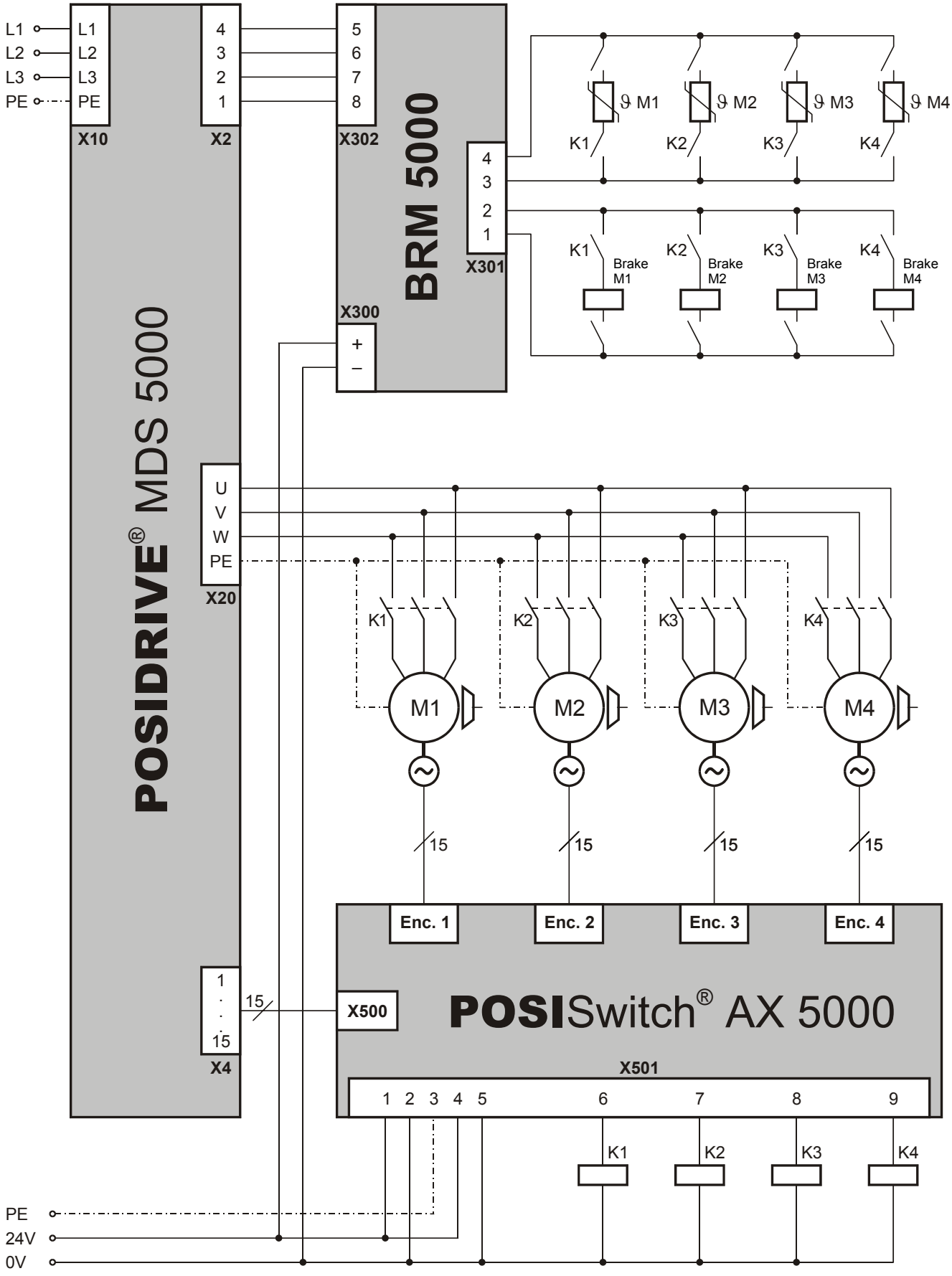


When **POSI**Switch® AX 5000 is configured, the device is adjusted to the application via the following parameters.

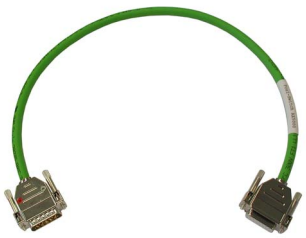
Par.	Description	Fieldbus Address	
F90 Global r=2, w=3	**Release time axis-switch:** Specifies the release time of the contactor used for the axis switchover. This minimum time is waited before the inverter lets the next contactor be applied. *Value range in msec: 0 ... 20 ... 32767* Fieldbus: 1LSB=1·msec; type: I16; ; USS address: 06 16 80 00 hex	2A5Ah	0h
F91 Global r=2, w=3	**Set time axis-switch:** Specifies the set time of the contactor used for the axis switchover. This time is at least waited before the inverter lets the axis be electrified. *Value range in msec: 0 ... 20 ... 32767* Fieldbus: 1LSB=1·msec; type: I16; ; USS address: 06 16 C0 00 hex	2A5Bh	0h
H08 Achse, OFF r=2, w=2	**PosiSwitch® encoder selector:** Available as an option, the **POSI**Switch® control module permits the connection of several motors to one inverter. In **H08** it can be set separately for each of the four (software) axes which connection on the **POSI**Switch® (i.e., which motor) is allocated to the particular axis configuration. This routine permits two or more applications to be run together on separate (software) axes with a single motor. **Note:** Following a change in parameter **H08,** correct evaluation of the electronic nameplate is not ensured until after a device new start. *0: Enc1*; *1: Enc2*; *2: Enc3*; *3: Enc4*; Field bus: 1LSB=1; Typ: U8; USS-Adr: 08 02 00 00 hex 👁 Only when a **POSI**Switch® was detected on X4.	2E08h	0h
H18 Global, OFF read (2)	**Posi-switch® port-status:** Indicates as a binary word the **POSI**Switch® ports to which encoders are connected. This is determined by the inverter during startup. Fieldbus: 1LSB=1·; type: U8; ; USS address: 08 04 80 00 hex 👁 Only when a **POSI**Switch® was detected on X4	2E12h	0h
U12 Global r=3, w=3	**Level motor connection:** When the axis switch via **POSI**Switch® is utilized, the inverter can test during switching whether the contactor of the motor to be switched off has actually broken contact (opened). In addition, under certain circumstances, it can be determined that no motor is connected. *0: inactive* *3: fault* Fieldbus: 1LSB=1·; type: U8; ; USS address: 15 03 00 00 hex	480Ch	0h

7 EXAMPLES

7.1 Principal Circuit Diagram (without Shielding)



8 ACCESSORIES

	ID No.	Designation	Remarks
	45405	**POSI**Switch® **connection cable (0.5 m)** Connection cable **POSI**Switch® AX 5000 to **POSIDRIVE**® MDS 5000 Length: 0.5 m (fabricated)	Chap. 3
	45386	**POSI**Switch® **connection cable (2.5 m)** Connection cable **POSI**Switch® AX 5000 to **POSIDRIVE**® MDS 5000 Length: 2.5 m (fabricated)	Chap. 3
	44989	**Product CD " STÖBER ELECTRONICS 5000"** This CD-ROM contains: • **POSI**Tool (PC program for programming, operator control and monitoring of the inverter) • Documentation • Fieldbus files	Download **POSI**Tool Also via: *http://www.stoeber.de*

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